

Third, Thermo incorrectly contends that the Court's construction of the "means for flowing" limitation in the Micromass case was incorrect because Micromass allegedly did not provide the Court with an "adequate explanation of the underlying technology." Thermo Br. 38. Thermo's contention is both false and irrelevant. It is false because, as explained above, the "underlying technology" was thoroughly explained to the Court in the Micromass case at the *Markman* hearing, in the claim construction briefs, and in the video tutorials submitted by both parties to the Court. It is irrelevant because Thermo admits that Micromass did dispute AB/Sciex's position that "the existence of gas in a chamber, separated from the first vacuum chamber by the inlet orifice, at a higher pressure than that in the first vacuum chamber" is the corresponding structure for the "means for flowing" element. Thermo Br. 38. Thermo's argument is nothing more than an attempt to concoct an issue where none exists. Thermo asserts that in the Micromass case:

No one made clear, for example, the significance of the difference between (a) using the natural pressure differential between the atmospheric ion source and the low pressure analyzer to push ions "downstream," as opposed to (b) actually pumping gas into an intermediate chamber to create an additional pressure push.

*Id.* The reason that "no one made [that] clear" is that it is a false distinction that is irrelevant to how the "means for flowing" limitation should be construed. In *both* cases, *the pressure differential* is the corresponding structure for the "means for flowing" element because it actually performs the recited function. Thermo attempts to incorporate elements involving the curtain gas source as part of the corresponding structure, even though those elements are *not required* "to flow gas through said inlet orifice and into said first space." This inclusion is an improper attempt to incorporate

structure “beyond that necessary to perform the claimed function.” *Asyst Techs.*, 268 F.3d at 1370 (citing *Micro Chem.*, 194 F.3d at 1257-58).

The Court already rejected the same argument in the Micromass case. Like Thermo here, Micromass argued that the curtain gas source is the corresponding structure for the “means for flowing” claim element. *Applera*, 186 F. Supp. 2d at 520 (JA518). In response, AB/Sciex argued, as it does here, that the corresponding structure is not the curtain gas source and chamber, but rather the pressure differential. *Id.* The Court rejected Micromass’s position in favor of AB/Sciex’s, and concluded that the function of flowing gas through the inlet into said first space is performed by “the existence of gas in a chamber, separated from the first vacuum chamber by the inlet orifice, at a higher pressure than that of the first vacuum chamber.” *Id.*

**D. “Rod,” “Rod Set,” “Rod Means,” and “Parallel Rod Means”**

'736 Term	Claims	AB/Sciex’s Proposal	Thermo’s Proposal
“rod”	1, 14	An electrode having a length along an ion path that produces an external electrical field over that length when a voltage is applied.	A “slender bar” that is, in accordance with the meaning of “slender,” narrow in circumference in proportion to its length, and substantially longer than it is wide.
“rod set”	1, 14	Two or more rods.	A number of rods of the same kind that belong or are used together. This is in accordance with the meaning of “set,” which means a number of things of the same kind that belong or are used together.
“rod means”	1, 14	Means “rods” and therefore requires no construction separate from the construction of “rods.”	<p>“Rod means” is a means-plus-function limitation subject to 35 U.S.C. § 112, ¶ 6.</p> <p>For claim 1, the function is to define an elongated space therebetween.</p> <p>For claim 14, the function is to define longitudinally extending first and second spaces, respectively.</p> <p>The corresponding structures are four 15-cm quadrupole mass spectrometer rods that are not too short as described in the specification.</p>

'736 Term	Claims	AB/Sciex's Proposal	Thermo's Proposal
"parallel rod means"	1	Rods that extend in the same direction and everywhere equidistant.	Rod means that extend in the same direction and everywhere equidistant.

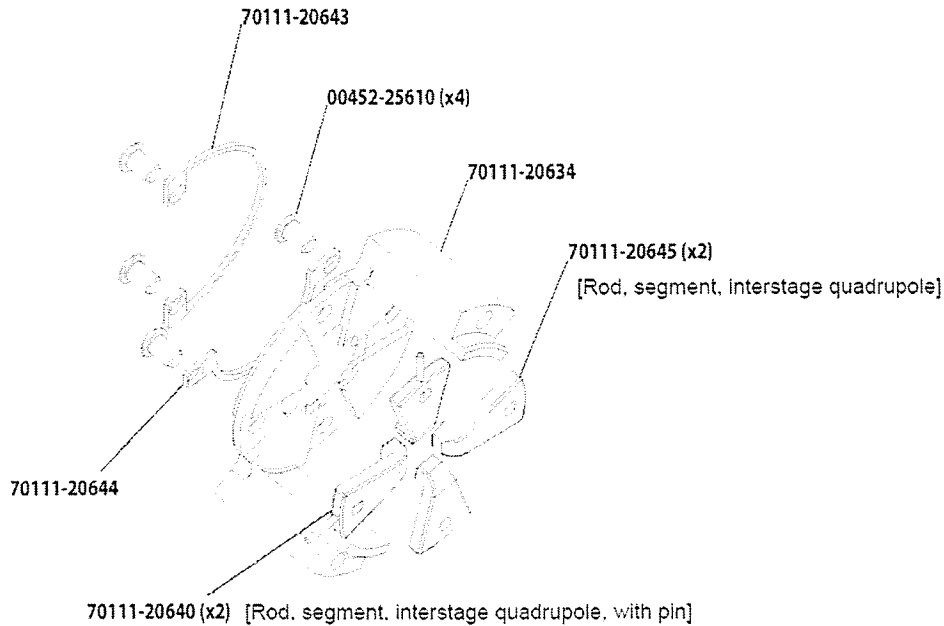
### 1. "Rod"

Thermo's non-technical dictionary-based construction seeks to limit "rod" to a particular shape, *i.e.*, a slender bar that is narrow in circumference in proportion to its length, and substantially longer than it is wide. Thermo's agenda is to remove from the scope of the claim the shorter and non-cylindrical rods in its accused devices. Thermo's litigation-driven construction should be rejected because it is contrary to how the term "rod" is used in the '736 patent and in the field of mass spectrometry, and it excludes an embodiment taught by the patent.

As explained in AB/Sciex's opening brief, "rod" is a technical term in the field of mass spectrometry, and a person of ordinary skill reading the '736 patent would understand that "rod" is not limited to a particular shape, but instead refers to an electrode having a length along an ion path that produces an external electrical field over that length when a voltage is applied. AB/Sciex Br. 28. Although Thermo seeks to limit "rod" to a slender bar here, in its manuals, Thermo uses the term in a manner consistent with its ordinary usage in the field of mass spectrometry to describe rods of various shapes, including "square," "round," and "hyperbolic" rods. *See, e.g.*, A35 ("The Q00 quadrupole is a square array of *square-profile* rods." (emphasis added)); A91 ("The Q1 octapole is an octagonal array of *round-profile* rods that acts as an ion transmission device similar to Q00 and Q0." (emphasis added)); A91 ("The linear ion trap is a square array of precision-machined and precision-aligned *hyperbolic* rods." (emphasis added)).

Further, Thermo refers to its Q00 ion guide as consisting of “rods” in its April 2003

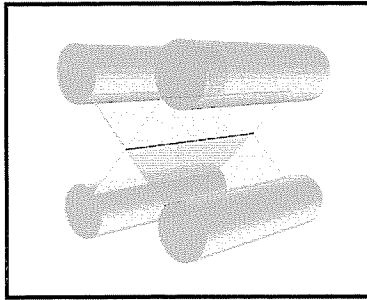
Quantum Ultra Hardware Manual:



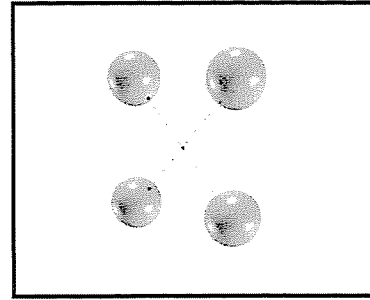
**Figure 8-6. Q00 stack assembly part numbers**

B62 (bracketed phrases added). Each rod is the base of a L-shaped segment. The base of the “L,” *i.e.*, the rod, has a length along an ion path that produces an external electrical field over that length when a voltage is applied. Thus, outside of the courtroom, Thermo acknowledges that “rod” is not limited to a particular shape, and Thermo uses the term “rod” in accordance with the technical meaning proposed by AB/Sciex.

Moreover, Thermo mischaracterizes AB/Sciex’s proposed construction when it argues that “[b]ecause every shape has a ‘length,’” “even a perfect sphere or a cube could be a ‘rod.’” Thermo Br. 40. AB/Sciex does not contend that a sphere is a “rod” because, as illustrated below, a sphere does not have a length along the ion path but instead only a point along the ion path:



The “rods” described in the ’736 patent have a length along the ion path.



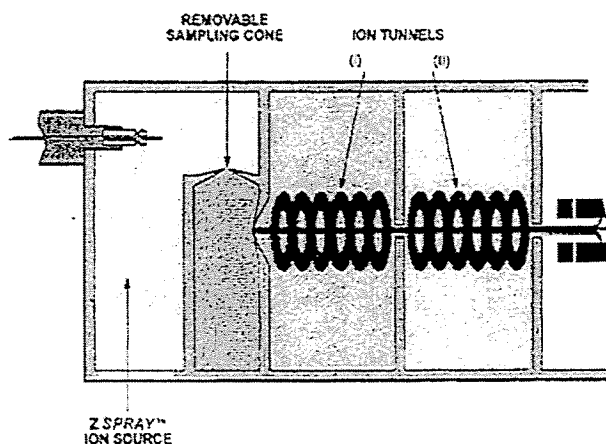
Spherical electrodes are not “rods” because they do not have a length along the ion path.

As for a cube, even Thermo admits that the cross-sectional profile of a “rod” can be “square.” A35, A41.

Further, a person of ordinary skill would understand that “rod” does not impose any minimum rod length, and that a rod’s length can be less than its width. For example, the ’736 patent explains that the necessary rod length is approximately inversely proportional to the operating pressure and specifies “that pressures of up to between 150 and 200 milliTorrr can be used if desired.” JA22, 13:3-31, 65-66. At a pressure of 200 mtorrr, for the  $P \times L$  product to equal or exceed  $2.25 \times 10^{-2}$  torr cm, the length of the rod could be as short as 1.125 mm. The mass spectrometer disclosed in the ’420 patent (the structure of which is “essentially the same” as that disclosed in the ’736 patent (JA17, 4:51-53)) teaches that a rod diameter of 0.625 inch (or 16 mm) is typical. JA117, 8:25-26. Therefore, the ’736 patent specification contemplates an embodiment with rods 1.125 mm long and 16 mm wide – a rod that is much shorter than it is wide. Thermo’s proposed construction would exclude this embodiment disclosed in the specification from the scope of the claim. Such an interpretation “is rarely, if ever, correct,” and should be rejected. *Vitronics Corp. v. Conceptoronic, Inc.*, 90 F.3d 1576, 1583 (Fed. Cir. 1996).

Finally, Thermo’s argument that AB/Sciex’s proposed construction of “rod” is inconsistent with AB/Sciex’s “concession in the *Micromass* case that ‘the electrode **rings** of [an] ion tunnel’ differ from ‘**rod** sets’ because the former ‘create electric fields in an

axial dimension.” is incorrect. Thermo Br. 40 (emphasis in original). In the Micromass case, one of the two accused devices included an “ion tunnel,” which is an ion guide consisting of a stack of rings arranged so that the ion path passes through the center of the stack, as illustrated below:



A136; see also *Applera*, 204 F. Supp. 2d at 729, 741, 743-44 (JA534, 546, 548-49) (discussing the “Ion Tunnel Quattro Ultima”). In Micromass’s ion tunnel, the relevant fields are generated *internal* to each ring, not external to them. Thus, the rings in Micromass’s ion tunnel are not embraced by AB/Sciex’s proposed construction of the term “rod,” which embraces an electrode having a length along an ion path that produces an *external electrical field* over that length when a voltage is applied.<sup>11</sup> Moreover, AC fields are generated between rings in Micromass’s ring stack ion guide in the axial direction, albeit without producing any net axial field. See *id.* at 774 (JA579). AB/Sciex agreed that these AC fields existed in the ion tunnel and did not exist in the ion guide, *i.e.*, the “first rod set,” of the ’736 patent. *Id.* However, AB/Sciex did not differentiate

<sup>11</sup> Micromass’s mass spectrometer that included the ion tunnel was found to infringe under the doctrine of equivalents, not literally. *Id.* at 777 (JA582).

the claimed rods from the rings in the Micromass instrument based just on their respective shapes, as Thermo argues.

## 2. “Rod Set”

Thermo’s proposed construction of “rod set” would require that all the rods be “of the same kind.” D.I. 64, Ex. A at 4. Further, Thermo argues that a “rod set” requires a “group of like, if not identical, structures sharing a common function,” such as guiding ions or mass analyzing. Thermo Br. 41. Both of these requirements are incorrect and are not supported by the various dictionary definitions of “set” that Thermo cites.

First, the dictionary definitions of “set” Thermo cites do not require a common function. TA139, TA161, TA181. To impose any particular function, such as guiding ions or mass analyzing, would improperly read a functional limitation into the term “set.” *See Medrad, Inc. v. MRI Devices Corp.*, 401 F.3d 1313, 1319 (Fed. Cir. 2005) (maintaining the Federal Circuit’s “unremarkable proposition” that “where a function ‘is not recited in the claim itself by the patentee, we do not import such a limitation’” (citation omitted)).

Second, the ordinary meaning of “set” is not limited to a collection of items “of the same kind.” For example, one of the dictionaries cited by Thermo defines “set” as “1. A group of persons or things connected by or collected for their similar appearance, interest, importance, or the like: *a chess set*.” TA139 (emphasis in original); *see* Thermo Br. 41. A chess set contains various playing pieces – *e.g.*, queen, rook, bishop, knight, pawn – but those pieces are not the same and have different functions. Another dictionary cited by Thermo defines “set” as “a group of articles of uniform design <~ of dining room furniture> <~of dishes>.” TA181; *see* Thermo Br. 41. A set of dining room furniture contains various pieces of furniture – *e.g.*, a table, chairs – but those pieces are

not the same; likewise, a set of dishes contains various dishes – *e.g.*, plates, bowls, cups – but those dishes are not the same.

Thus, the ordinary meaning of “set” does not require a common function or that the items in the set be “of the same kind,” which is consistent with AB/Sciex’s proposed construction that “rod set” simply means “two or more rods.” This construction is also consistent with the specification, which does not impose any function or require that the rods be “of the same kind.” Moreover, this construction is also consistent with the Court’s prior construction of “rod set.” *See Applera*, 186 F. Supp. 2d at 508 (JA506) (construing “rod set” to require “a plurality, meaning two or more, of rods in each rod set”).

### 3. “Rod Means”

Thermo argues that the use of the word “means” triggers a presumption that “rod means” is a means-plus-function limitation subject to 35 U.S.C. § 112, ¶ 6, and is thus limited to the corresponding structure of “four 15-cm ‘quadrupole mass spectrometer rods’ that are not ‘too short.’” Thermo Br. 41-42. Thermo, however, fails to acknowledge that this presumption is rebuttable and that, in this case, the presumption is overcome. As the Federal Circuit has explained:

The use of the word “means” “triggers a presumption that the inventor used this term advisedly to invoke the statutory mandate for means-plus-function clauses.” This presumption may be overcome in two ways. First, “a claim element that uses the word ‘means’ but recites no function corresponding to the means does not invoke § 112, ¶ 6.” Second, “even if the claim element specifies a function, if it also recites sufficient structure or material for performing that function, § 112, ¶ 6 does not apply.” *A claim term recites sufficient structure if “the ‘term, as the name for structure, has a reasonably well understood meaning in the art.’” The mere use of the word “means” after a limitation, without more, does not suffice to make that limitation a means-plus-function limitation.*

*Allen Eng'g v. Bartell Indus.*, 299 F.3d 1336, 1347 (Fed. Cir. 2002) (citations omitted; emphasis added); *see also Cole v. Kimberly-Clark Corp.*, 102 F.3d 524, 531 (Fed. Cir. 1996) (“[T]he claim drafter’s perfunctory addition of the word ‘means’ did nothing to diminish the precise structural character of this element. It definitely did not somehow magically transform this element into a § 112, ¶ 6, ‘means-plus-function’ element.”).

Here, “rod means” is not a § 112, ¶ 6 element because the term “rod” by itself recites sufficient structure. *Allen*, 299 F.3d at 1347. As explained above, the term “rod” “has a reasonably well understood meaning in the art” of mass spectrometry. *See id.* Even Thermo concedes the indisputable fact that a “rod” is a structure. *See Thermo Br.* 40 (admitting that the term “rod” is “a term describing a structure”). The “rod means” limitation is not a means-plus-function limitation which recites unspecified “means for” performing a function. Both claims identify the structure by using the word “rod” before the word “means.” Claim 1 goes on to further describe the structure as “a plurality of elongated parallel rod means spaced laterally apart a short distance from each other.” The term “rod means” is not a means-plus-function limitation. It simply means “rod” and requires no further construction. Moreover, there is no function attached to the term “rod.” What Thermo recites as function, namely, a plurality of elongated rod means spaced laterally apart a short distance from each other to define an elongated space therebetween, is nothing more than the relative positioning one rod has to another. This positioning is not “function”; it is an arrangement of structure.<sup>12</sup>

---

<sup>12</sup> Thermo further seeks to limit the corresponding structure of the pathway defined by the “rod means” by incorrectly arguing that the “long pathway must also be thin because ions need to be confined to a narrow beam so that they can be transmitted effectively through ‘the small interchamber orifice 34.’” *Thermo Br.* 42-43. Thermo completely misses an important benefit of the invention. The ’736 patent teaches that the pathway need not be thin, having a diameter of, (continued...)

#### 4. “Parallel Rod Means”

The parties agree that “parallel rod means” means structures “that extend in the same direction and everywhere equidistant.” The only dispute relates to whether the structures are “rods” as AB/Sciex contends, or “rod means” as Thermo contends.

#### E. “Extending Along at Least a Substantial Portion of the Length of Said Vacuum Chamber”

'736 Term	Claim	AB/Sciex's Proposal	Thermo's Proposal
“extending along at least a substantial portion of the length of said first vacuum chamber”	1	“Substantial portion” means a portion that is significant for purposes of avoiding scattering and losses of ions within the chamber.	Having a length extending at least most of the length of the first vacuum chamber.

Thermo’s proposed construction of “substantial” as meaning “at least most of the length of said first vacuum chamber” is both vague and divorced from the teachings of the specification. Thermo primarily relies on dictionary definitions of “substantial,” yet proposes a more restrictive construction than these definitions would support. Thermo’s definitions – *e.g.*, “considerable in amount,” “the main part,” “largely” (Thermo Br. 43) – are not synonymous with Thermo’s construction: “at least most.” Moreover, these definitions are unhelpful because “substantial” is a relative term whose meaning varies according to the context.

The meaning of “substantial” in the context here, however, is expressly addressed by the specification of the ’736 patent. The specification teaches that the length of the first rod set must occupy a significant length of the ion guide chamber, that is, a length that allows the rod set to guide the ions and to avoid scattering and losses of ions. JA22,

---

*e.g.*, 11 mm, because the ions are collisionally focused and can pass through the interchamber orifice having a diameter of, *e.g.*, 1 mm or 2.5 mm. JA18, 6:19-21, 62-68. Thus, there is no basis for limiting the corresponding structure to include a long and thin pathway.

14:4-9. In other words, the specification defines the meaning of the term “substantial” according to the function of the rod set as an ion guide.<sup>13</sup> AB/Sciex’s proposed construction incorporates this functional definition by defining the term “substantial portion” to mean “a portion that is significant for purposes of avoiding scattering and losses of ions within the chamber.”

Thermo complains that AB/Sciex “attempts to turn a structural limitation regarding the rod set’s length into a recitation of the rod set’s ‘purposes,’” but construing the term “substantial” in light of its function as described in the specification is entirely appropriate under the case law. *See, e.g., Exxon Research & Eng’g Co. v. United States*, 265 F.3d 1371, 1381 (Fed. Cir. 2001) (construing “substantial absence of slug flow” to mean “no slug flow or such minimal slug flow that the slug flow has no appreciable impact on reactor efficiency”); *Ex parte George*, 230 U.S.P.Q.(BNA) 575, 577 (B.P.A.I. 1984) (construing “substantial” in “substantial pressure contact” as “denoting a desired degree of pressure contact for effecting the gravure printing function”).

**F. “Elongated Parallel Rod Means Spaced Laterally Apart a Short Distance”**

’736 Term	Claim	AB/Sciex’s Proposal	Thermo’s Proposal
“each rod set comprising a plurality of elongated parallel rod means spaced laterally apart a short distance from each other to define an elongated space therebetween extending longitudinally through such rod set”	1	“Elongated” means having a length that exceeds its width.	“Elongated” means “stretched out” and having a form notably long in comparison to its width.
		“Spaced laterally apart a short distance” requires no construction.	Spaced laterally apart a short distance” means that the rod means are separated by a distance substantially less than the length of each elongated rod.

<sup>13</sup> Contrary to Thermo’s argument, the specification does *not* teach that the rod set must occupy a certain percentage of the first vacuum chamber, and certainly not the 60% Thermo’s counsel apparently measured based on patent figures that are not intended to serve as scaled engineering drawings. Thermo Br. 44 (citing JA1, JA10, Figs. 1, 12)

### 1. “Elongated”

Thermo’s proposed construction of “elongated” builds upon its incorrect proposed construction of “rod.” Relying on the example of the 15 cm long rod set used in conducting the experiments disclosed in the ’736 patent, Thermo incorrectly imports a limitation from the preferred embodiment to argue that since a “rod” must be longer than it is wide under Thermo’s proposed construction of “rod,” an “elongated” rod must be even longer, *i.e.*, “notably long in comparison to its width.” Thermo Br. 45. As explained above, however, one of ordinary skill would understand that a “rod” need not be longer than it is wide; it need only be as long as is necessary to meet or exceed the  $P \times L$  product of  $2.25 \times 10^{-2}$  torr cm. JA22, 13:3-31 (teaching that the  $P \times L$  product is the “significant parameter” and that as pressure increases, rod length decreases), JA22, 13:65-66 (teaching the use of a pressure of 200 mtorr, which, as explained above would permit a rod length as short as 1.125 mm). Since one of ordinary skill would understand that a “rod” need not be longer than it is wide, he or she would also understand that an “elongated” rod (or space) need only have a length that exceeds its width.

### 2. “Spaced Laterally Apart a Short Distance”

Thermo relies on a coincidence – that in one exemplary embodiment described in the specification the 11 mm spacing between the rods is much less than the 15 cm length of the rods – to argue that this term should be construed to require that “the rod means are separated by a distance substantially less than the length of each elongated rod.”

Thermo’s proposed construction improperly seeks to import a limitation from the specification which is not even there. The specification does not describe any specific relationship between the spacing of the rods and the length of the rods. However, it was

well known at the time the application for the '736 patent was filed that the spacing of the rods is related to the radius of the rods, not the length of the rods. *See, e.g.*, B87 (teaching that the spacing of the rods (*i.e.*, the inscribed circle within the rods) is a function of the radius of the rods: "The optimum size for the rods is the radius  $r = 1.148 r_0$ , where  $r_0$  is the field radius."). One of ordinary skill would have understood this relationship, and also would have understood that the spacing of the rods is not related to the length of the rods. Moreover, Thermo ignores the embodiment discussed above where the rods are only about 1 mm long. *See* JA22, 13:65-66. For that embodiment, the 11 mm spacing of the rods would be much greater than the rod length.

**G. "Space . . . Extending Longitudinally" and "Longitudinally Extending Spaces"**

'736 Term	Claims	AB/Sciex's Proposal	Thermo's Proposal
"space . . . extending longitudinally through such rod set" (claim 1) "longitudinally extending first and second spaces" (claim 14)	1, 14	Space that runs lengthwise down the rods.	Space that runs lengthwise down the rods, and that is longer than it is wide.

Thermo's proposed construction is improper because it excludes at least one embodiment taught in the specification, and it improperly imports additional limitations into the claim. First, in the embodiment discussed above with 1 mm long rods, the space running lengthwise down the rods (1 mm) is not longer than the width of the space (the 11 mm inscribed circle). JA18, 6:19-21; JA22, 13:65-66. As such, contrary to Thermo's assertion, the intrinsic evidence does not uniformly describe the distance between the rods as substantially smaller than the length of the rods. *See* Thermo Br. 46. Second, neither the dictionary definitions nor the intrinsic evidence supports importing the requirement that the length of the space must be longer than it is wide into "space . . .

extending longitudinally” and “longitudinally extending . . . spaces.” Although Thermo selectively identifies “to stretch out” as one definition of “extend,” another definition is “to cause to project in one or more directions.” TA177. This definition supports AB/Sciex’s construction and does not impose any relationship between the length and the width of the space between the rods, consistent with the teachings of the specification.

#### H. “Located End to End”

'736 Term	Claims	AB/Sciex’s Proposal	Thermo’s Proposal
“located end to end”	1, 14	The rod sets and spaces must be arranged in a manner that ions may be successfully transmitted from the end of the first rod set or the first space to the end of the second rod set of second space.	No construction necessary in light of construction of “aligned.”

Thermo’s dismissal of the construction of “located end to end” adopted by the Court in the Micromass litigation, and affirmed by the Federal Circuit, as having been adopted “to reject Micromass’ argument” is nonsensical.<sup>14</sup> *See* Thermo Br. 47. The construction was adopted because the Court and the Federal Circuit correctly concluded that it is the proper construction under the law, not because Micromass opposed it.

Thermo opposes its inclusion here not because it is incorrect, but because it is “long . . . confusing and unnecessary.” *Id.* Length is not a sound basis for excluding this construction. Thermo has disputed the meanings of twenty terms and phrases in the claims of the ’736 patent, several of which were previously construed by the Court in the Micromass litigation. Length, at least in the aggregate, clearly is not Thermo’s real

---

<sup>14</sup> Micromass argued before the Court and on appeal that “located end to end” meant that the end of the first rod set must be placed at *or near* the end of the second rod set (B91; A144), not, as Thermo says, that “the rod set in one chamber must be placed against the rod set in the next chamber.” Thermo Br. 47.

concern. Moreover, including the construction of “located end to end” will not confuse the jury. In fact, omitting it may confuse them.

Thermo argues that the jury will be enlightened by being referred to Figure 1, one of the preferred embodiments. *Id.* However, the whole point of the construction of “located end to end” is that it encompasses *more* than the preferred embodiments. It encompasses arrangements of the rod sets and spaces wherein ions may be successfully transmitted from the end of the first rod set or the first space to the end of the second rod set of second space. Thermo undoubtedly wants the construction excluded so that the jury may be confused into thinking that the phrase limits the claims to the preferred embodiments, in which rod sets and the spaces defined by them are in adjacent chambers. This would be improper. The claims are not so limited and the construction should therefore be included.

#### I. “Means for Applying . . . Voltage”

'736 Term	Claim	AB/Sciex's Proposal	Thermo's Proposal
“means for applying essentially an AC-only voltage between the rod means of said first rod set so that the first rod set may guide ions through said first space”	1	The corresponding structure, material, or acts described in the specification are the rods of rod set 32 and, as is well known to those skilled in the art, an AC power supply connected to the rods.	Although the specification discloses rods between which AC voltage is applied, the specification does not disclose any structure for applying essentially an AC-only voltage between the rod means. Hence, the specification does not disclose the corresponding structure required for construction of this limitation under § 112, ¶ 6. This limitation and claim 1 are therefore indefinite.
“means for applying both AC and DC voltages between the rod means of said second rod set so that said second rod set may act as a mass filter for said ions”	1	The corresponding structure, material, or acts described in the specification are the rods of rod set 40 and, as is well known to those skilled in the art, AC and DC power supplies connected to the rods.	Although the specification discloses rods between which AC and DC voltages are applied, the specification does not disclose any structure for applying both AC and DC voltages between the rod means. Hence, the specification does not disclose the corresponding structure required for construction of this limitation under § 112, ¶ 6. This limitation and claim 1 are therefore indefinite.

Thermo contends that the specification does not disclose *any* structure for either “applying essentially an AC-only voltage between the rod means of said first rod set” or “applying both AC and DC voltages between the rod means of said second rod.” Thermo Br. 48. In order to prevail on its indefiniteness defense, Thermo must prove by clear and convincing evidence that, from the perspective of a person skilled in the art, *no* structure is disclosed. *Budde v. Harley-Davidson, Inc.*, 250 F.3d 1369, 1376-77 (Fed. Cir. 2001).

Thermo cites *Default Proof Credit Card Sys., Inc. v. Home Depot U.S.A., Inc.*, 412 F.3d 1291 (Fed. Cir. 2005) for the proposition that “[a]s a matter of law, corresponding structure cannot be found in . . . the knowledge of those skilled in the art.” Thermo Br. 49. In *Default Proof*, however, there was absolutely *no* corresponding structure disclosed. 412 F.3d at 1302. While it is correct that the specification must disclose some structure,<sup>15</sup> “the patentee need not disclose details of structures well known in the art.” *Id.* at 1302; *see also S3 Inc. v. nVIDIA Corp.*, 259 F.3d 1364, 1371 (Fed. Cir. 2001); *Atmel Corp. v. Info. Storage Devices, Inc.*, 198 F.3d 1374, 1378 (Fed. Cir. 1999).

A patentee can disclose a structure by simply naming it if one skilled in the art would understand what that structure includes. Thus, in *S3*, it was sufficient disclosure for the specification to name a “selector,” because “a selector is a standard electronic component whose structure is well known in this art.” *S3*, 259 F.3d at 1370. Similarly, in *Atmel*, the title of a publication naming a structure in the specification was “sufficient to indicate to one skilled in the art the precise structure of the means recited in the specification.” 198 F.3d at 1382. In *In re Dossel*, 115 F.3d 942 (Fed. Cir. 1997), the specification did not even name a structure, yet the Federal Circuit concluded that the

---

<sup>15</sup> “[T]he testimony of one of ordinary skill in the art cannot supplant the *total absence* of structure from the specification.” *Id.* at 1302 (emphasis added).

structure “must be” a computer because it was implicit from the perspective of one skilled in the art. *Id.* at 946-47.

Here, the specification names “AC-only quadrupole mass spectrometer rods” and further states that “[a]n AC RF voltage (typically at a frequency of about 1 Megahertz) is applied between the rods of rod set 32, *as is well known*, to permit rod set 32 to perform its guiding and focussing function.” JA17, 4:21-23, 43-46 (emphasis added). The specification also names “standard quadrupole mass spectrometer rods” in stating that “[c]hamber 38 contains a set of four standard quadrupole mass spectrometer rods 40” and that “[b]oth DC and AC RF voltages are applied between the rods of rod set 40, so that rod set 40 performs its normal function as a mass filter.” *Id.*, 4:27-28, 46-48. Evidence that one skilled in the art would understand what was included in these named structures is contained in Dr. French’s ’420 patent, to which the specification directs the reader. The specification cites the ’420 patent as describing essentially the same structure and operation as Figure 1. *Id.*, 4:51-53. The ’420 patent includes Figure 6 and associated text that describes quadrupole rods with AC and DC power coupled appropriately. JA116, 5:59-6:18; JA118, 9:56-65. The naming of “AC-only quadrupole mass spectrometer rods” and “standard quadrupole mass spectrometer rods” is sufficient disclosure of corresponding structure under Federal Circuit precedent.

Thermo argues that inclusion of the rods as part of the corresponding structure “makes no sense” because “[t]he rods are the objects to which voltages are applied.” Thermo Br. 48. However, the recited function is not applying voltages *to* the rods, it is applying voltages *between* the rods. The rods are the electrodes. They are part of the structure that produces voltages between them. Moreover, Thermo’s position is

inconsistent with the positions it is taking regarding other means-plus-function limitations. For example, with regard to the “means for maintaining the kinetic energies of ions flowing from said inlet orifice to the first rod set . . . ,” Thermo includes the rod set in the corresponding structure (as does AB/Sciex). D.I. 64, Ex. A at 15. Similarly, with regard to the “means for flowing gas through said inlet orifice . . . ,” Thermo includes the inlet orifice in the corresponding structure (as does AB/Sciex). *Id.* at 13. Thermo cannot have it both ways.

**J. “Essentially Only an AC-Only Voltage”**

'736 Term	Claim	AB/Sciex's Proposal	Thermo's Proposal
“means for applying essentially an AC-only voltage between the rod means of said first rod set so that the first rod set may guide ions through the first space”	1	“Essentially an AC-only” allows for some DC component.	Essentially an AC-only voltage between the rod means” means a voltage between the rod means that is essentially AC-only and that lacks any placed DC component that would cause the rod set to act as a mass filter.
“placing an essentially AC-only RF voltage between the rod means of said first rod set so that said first rod set acts to guide ions therethrough”	14	Same.	Placing an essentially AC-only RF voltage between the rod means” means placing an RF voltage between the rod means that is an essentially AC-only RF voltage and that lacks any placed DC component that would cause the rod set to act as a mass filter.

Thermo does not dispute that the term “essentially” allows for some DC component, but argues that the voltage “must lack any deliberately applied DC component that would cause the ‘rod set’ in question to change its fundamental nature by being transformed from an ion guide into a ‘mass filter.’” Thermo Br. 50. AB/Sciex agrees that a voltage that has a DC component that causes the rod set to no longer be an ion guide is not essentially AC-only. The claim language requires that the voltage be applied “so that the first rod set may *guide ions* through the first space” (claim 1 (emphasis added)) or “so that said first rod set acts to *guide ions* therethrough” (claim 14

(emphasis added)). JA22, 14:51-53; JA23, 16:4-6. Thus, Thermo's argument that acceptance of AB/Sciex's proposed construction leaves no restriction on the amount of DC component is incorrect. The claim language itself imposes the limitation that any DC component not be such as to change the fundamental nature of the first rod set as an ion guide.

Since the claim language limits the DC component, it is unnecessary and potentially confusing to the jury to add a negative limitation that the rod set not act as a mass filter. Moreover, the addition of this limitation would erase the word "essentially" from the claim because any DC component no matter how small will produce some mass filtering effect. That is evident by referring to the Mathieu stability diagram (reproduced below) which is familiar to those skilled in the art. The Mathieu stability diagram is a graphical representation of ion motion in a quadrupole field such as the field found between the rods of the claimed ion guide:

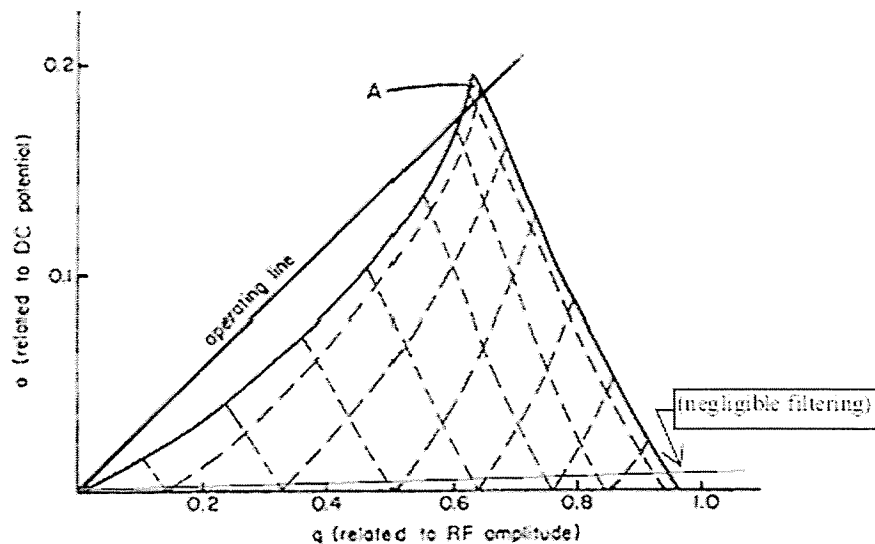


FIG. 4.8. Stability diagram of (a-q) space showing regions (patchwork area) that correspond to mathematically stable ion trajectories in the quadrupole mass spectrometer. Area A indicates region of stability limited by the operating line (established by ratio of DC:RF potentials) of the instrument.

B101 (J. Throck Watson, *Introduction to Mass Spectrometry* 77 (3<sup>rd</sup> ed. 1997)). The parameters  $a$  and  $q$  are related to DC voltage and AC voltage, respectively. B99-100. The diagram shows an exemplary “operating line” which corresponds to a particular ratio  $a/q$  or DC voltage to AC voltage. The portion of the plot above the operating line indicates the ion trajectories that are stable and thus the  $m/z$  (mass-to-charge) values of ions that would traverse through the field without hitting the electrodes or being ejected. In the example shown, a small portion of the trajectories, *i.e.*, a small range of  $m/z$  values, is stable and thus most  $m/z$  values are filtered. Where there is no DC component ( $a = 0$ ), the slope of the operating line is 0, *i.e.*, it corresponds to the x axis and allows for the smallest possible amount of mass filtering.<sup>16</sup> If any DC component is added, the slope of the operating line is some positive value causing increased mass filtering. If the ratio of DC voltage to AC voltage is very small, the slope of the operating line is very gradual. The red line added to the diagram above (labeled “negligible filtering”) shows such a hypothetical operating line. Almost the entire plot of stable ion trajectories is above the red operating line and extent of the mass filtering is negligible. But there is some.

Thermo’s negative limitation looks at the wrong end of the telescope. The claim requires that “essentially an AC-only voltage” be applied so the first rod set may guide ions. It is the ion guiding function that informs those skilled in the art what constitutes “essentially an AC-only voltage.”

---

<sup>16</sup> Even with no DC component, some filtering of ions with low  $m/z$  ratios will occur. See B3 (Igor V. Chernushevich et al., *An Introduction to Quadrupole-Time-of-Flight Mass Spectrometry*, 36 J. Mass Spectrometry 849, 851(2001)).

**K. “Mass Filter”**

'736 Term	Claims	AB/Sciex's Proposal	Thermo's Proposal
“mass filter”	1, 14	A device that passes through ions of one or more mass to charge ratios while filtering out ions of all other mass to charge ratios.	A device that passes through ions of one or more select mass-to-charge ratios while filtering out ions of all other mass-to-charge ratios, and which does not function as an ion trap.

Thermo makes four arguments in support of its proposed inclusion of the negative limitation “and which does not function as an ion trap” in the construction of the term “mass filter”: (1) an ion trap is not a mass filter because mass filters “are designed for continuous transmission of selected ions through the filter to a detector” (Thermo Br. 52); (2) MDS disavowed coverage of ion traps during the reexamination (*id.* at 53-55); (3) AB/Sciex is judicially estopped from urging a construction that covers ion traps because of statements made by AB/Sciex in the Micromass case (*id.* at 55-56); and (4) AB/Sciex is collaterally estopped from urging such a construction because Judge McKelvie ruled that the claims do not cover ion traps (*id.* at 56-57). None of these arguments supports the limitation Thermo proposes.

First, Thermo's notion that a “mass filter” always operates continuously and never in “batch mode” is inconsistent with the usage of the term in the art and with the ordinary meaning of the term “filter.” Thermo Br. 13-14, 52-53. The term “mass filter” has been used in reference to linear ion traps<sup>17</sup> (like the linear ion trap in Thermo's LTQ instrument), which filter ions in batches. U.S. Patent No. 5,179,278, an early patent<sup>18</sup>

<sup>17</sup> In a linear ion trap, “the ions are trapped in a 2D quadrupole [field] instead of the 3D quadrupole field” of a conventional ion trap. B104 (Mass Spectrometry, [http://en.wikipedia.org/wiki/Mass\\_spectrometry](http://en.wikipedia.org/wiki/Mass_spectrometry) (last visited Dec. 14, 2005)).

<sup>18</sup> Dr. Douglas's linear ion trap concept post-dates the invention of the '736 patent. The '278 patent issued in 1993 on an application filed in 1991. *See* JA 673.

issued to Dr. Douglas on a linear ion trap concept, describes a quadrupole rod set that accepts and stores ions by imposing DC voltage barriers at each end of the rods. JA677, 4:23-40. The ion storing rod set is used as a “pre-trap” for a “conventional ion trap,” *i.e.*, the conventional “ring electrode and end caps” structure. JA676, 1:15-18, 2:55-56; JA677, 4:50-53. The specification uses the term “mass filter” to describe an implementation of this ion storing rod set in which unwanted ions are ejected and desired ions are stored temporarily for subsequent passage to a conventional ion trap:

*Unwanted ions can be ejected by applying a low level DC voltage to the rods 44, in which case the rods 44 are no longer RF rods but act as a low resolution mass filter.*

JA679, 7:24-26 (emphasis added); *see also* JA680, 10:5-8 (“rods 44 simply act as a low resolution mass filter”). Thus, as the '278 patent indicates, the fact that ions are stored within the rod set has nothing to do with whether or not the rod set is a mass filter. The term “mass filter” applies because the rod set rejects unwanted ions and passes through the desired ions according to their mass-to-charge ratio, albeit not immediately.

Similarly, a later paper on linear ion traps by Welling describes a quadrupole rod set in which ions are stored, illustrated in Figure 2(a) reproduced below:



Fig. 2. Trap electrode configuration (a)

B114 (Welling *et al.*, *Ion/Molecule Reactions, Mass Spectrometry and Optical Spectroscopy in a Linear Ion Trap*, 172 *Int'l J. Mass Spectrometry & Ion Processes* 95 (1998)). The authors describe their linear ion trap as a “natural mass filter”:

Most of the trapping parameters are mass dependent. *Thus the rf-quadrupole ion trap is a natural mass filter. This mass selectivity can be used either to purify stored samples by expelling unwanted masses or to record accurate mass spectra by detecting the masses as they are expelled.*

*Id.* (emphasis added).

The fact that a device operates on batches does not remove it from the scope of the term “filter” as that term is commonly used. Anyone who has cooked spaghetti has filtered a batch of spaghetti and cooking water by pouring the contents of the pot through a colander. The colander ejects the unwanted cooking water and stores the spaghetti until it is served.

Thermo’s only support for its argument that an ion trap does not act as a filter is a tutorial on the ASMS website. Thermo Br. 53 (citing TA339). The tutorial discusses the conventional ring-end cap ion trap. TA340. No mention is made of a rod set that stores ions, ejects unwanted ions, and passes wanted ions through for detection.

Second, in the Request for Reexamination, MDS did not argue that the claimed “second rod set” does not trap ions, nor did it argue that a “mass filter” cannot trap ions. A disclaimer of claim scope only arises where the patentee makes “clear and unmistakable statements of disavowal” during prosecution. *Cordis Corp. v. Medtronic AVE, Inc.*, 339 F.3d 1352, 1358 (Fed. Cir. 2003) (citing *Omega Eng’g, Inc. v. Raytek Corp.*, 334 F.3d 1314, 1325-26 (Fed. Cir. 2003)). There was no disclaimer at all of the terms “second rod set” or “mass filter” as encompassing a rod set that traps ions, much less a “clear and unmistakable . . . disavowal.” At most, MDS argued that the claimed *ion guide*, *i.e.*, the “first rod set,” does not trap ions.

Each of the four ion trap prior art references that MDS distinguished during the reexamination – the Schaaf article, the Vedel article, the Stafford article and the Stafford

application – discloses a conventional three-dimensional ring-end cap ion trap. There were no prior art references before the Patent Office that disclosed linear ion traps because that concept did not exist in the prior art. Therefore, MDS could not possibly have directed any argument to such a device. As shown below, a conventional ring-end cap ion trap consists of a ring-type electrode (denoted as “a”) and two end cap electrodes (denoted as “b”) which create a three dimensional AC electric field. JA257 (Stafford).

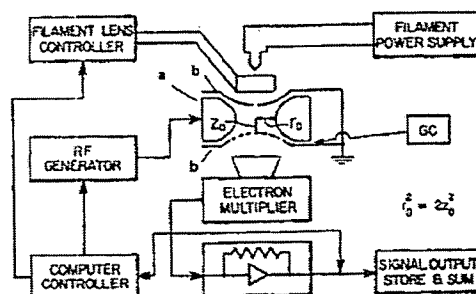


Fig.1. Schematic diagram of the Ion Trap Detector. The ring electrode, and the end cap electrodes are labelled 'a' and 'b' respectively.

Ions entering the ring-end cap ion trap are confined within the volume enclosed by the three electrodes. Typically a gas is introduced into the ring-end cap ion trap volume to “cool” ions through ion-molecule collisions. See, e.g., JA173.

These conventional ion trap references did not “cast substantial doubt on the validity of the '736 patent,” as Thermo argues. Thermo Br. 53. In fact, the only thing these references have in common with the '736 patent is that they teach the use of pressures in the trap that are in the ballpark of the pressures used in the ion guide of the preferred embodiment described in the '736 patent. Consequently, MDS distinguished the conventional ion trap of Schaaf from the *ion guide* of the '736 patent on the basis that it “operates on a fundamentally different principle than the mass spectrometer according to the invention.” JA 176. The ion guide, *i.e.*, the “first rod set,” is an ion *transmission* device and therefore is fundamentally different in principle from an ion trap, which stores

ions. Thermo avoids the key passage in the Request for Reexamination where that is made clear. This passage appears immediately after MDS's discussion of the non-obviousness of the use of high pressure in the ion guide of the '736 patent over Schaaf's use of "high pressure gas." MDS stated:

*The invention of the '736 patent relates to an ion transmission rod set in a mass spectrometer. The claimed mass spectrometer system has a first rod set in a first vacuum chamber and a second rod set in a second vacuum chamber. The first rod set receives essentially only an AC voltage so that ions are guided through the first vacuum chamber without being trapped there, while the second rod set receives both AC and DC voltages so that the second rod set may act as a mass filter.*

JA174-75 (emphasis added). Thus, MDS said that the "first rod set" does not trap. MDS did not say that the "second rod set" does not trap.

MDS also distinguished these prior art references based on the many structural differences between the claimed mass spectrometer system and the conventional ring-end cap ion trap. JA174-79. Thermo quotes passages from the Request for Reexamination in which the many structural differences were noted, but attempts to tie these arguments to the fundamental difference in principle – trapping versus not trapping – that MDS pointed out only with regard to the ion guide. Thermo Br. 53-54. That is a selective, self-serving, and inaccurate reading of the Request for Reexamination. MDS's distinction of the prior art ring-end cap ion traps based on these structural differences was not a "clear and unmistakable" disclaimer of all ion trap structures. It certainly was not a disclaimer of linear ion traps that reject unwanted ions and pass through desired ions according to their mass-to-charge ratio, since they did not exist in the prior art. At most it was a disclaimer of the specific ring-end cap structure of the ion traps disclosed in those references. *See Cybor Corp. v. FAS Techs.*, 138 F.3d 1448, 1458 (Fed. Cir. 1998) (en

banc) (finding that the patentee's prosecution statements "[could not] properly be interpreted as precluding coverage of every type of external reservoir" and holding that the scope of the disclaimer was thereby limited to the specific prior art reservoir structure as distinguished during prosecution); *Ekchian v. Home Depot, Inc.*, 104 F.3d 1299, 1304 (Fed. Cir. 1997) (limiting the scope of the patentee's disclaimer to the specific prior art as distinguished during prosecution). MDS never distinguished the claimed *mass filter* from the conventional ring-end cap ion trap references on the basis the mass filter does not trap ions.

Third, Thermo also relies on prior statements by AB/Sciex and Dr. Douglas and the prosecution history estoppel ruling by the Court in the Micromass case to argue that its negative limitation is compelled by the doctrines of judicial estoppel and collateral estoppel (issue preclusion). Thermo Br. 57. Neither of these doctrines applies here.

Judicial estoppel only applies when: (1) the party sought to be estopped is asserting a position that is irreconcilably inconsistent with one it asserted in a prior proceeding; (2) the party changed its position in bad faith, *i.e.*, in a culpable manner that threatens the Court's authority or integrity; and (3) the use of judicial estoppel is tailored to address the affront to the Court's authority or integrity. *Dam Things From Den. v. Russ Berrie & Co.*, 290 F.3d 548, 559 (3d Cir. 2002).

This doctrine has no application here because the statements by AB/Sciex and the inventors in the Micromass litigation are not at all inconsistent with AB/Sciex's position that the term "mass filter" embraces ion traps that consist of a rod set that filters ions. There was never any issue in the Micromass litigation regarding the relevance or lack of relevance of ion traps to the claimed "mass filter." There were two issues, and both